CLAIMS

1. A reader comprising:

a cartridge slot to receive therein a cartridge, the cartridge comprising

a housing comprising a chamber to receive therein a liquid and a liquid inlet provided through the housing into the chamber; and

at least one optical microfiber sensor comprising a functionalized surface having a compound attached thereto, the compound selected to react in accordance with a specific property of a liquid in which the functionalized surface is immersed, wherein reaction of the compound changes effective refractive index of the at least one optical microfiber sensor, wherein at least part of the functionalized surface is provided in the chamber to be immersed in the liquid;

at least one fiber Bragg grating provided to serve as a marker for measuring amount and direction of shift of dip wavelength output by the at least one optical microfiber sensor when the compound has reacted in accordance with a specific property of a liquid in which the functionalized surface is immersed; and

at least one photodetector provided to read peak intensity of Bragg wavelength of the at least one fibre Bragg grating, the reader thereby requiring no optical spectrum analyser.

2. The reader of claim 1, wherein the at least one fiber Bragg grating comprises a first fiber Bragg grating and a second fiber Bragg grating, wherein wavelength separation between Bragg wavelength of the first fiber Bragg grating (λ_{b1}) and Bragg wavelength of the second fiber Bragg grating (λ_{b2}) are set at three quarters of a free spectral range of output wavelength spectrum of the optical microfiber sensor.

3. The reader of claim 2, wherein λ_{b1} is set at a dip or peak wavelength of the output wavelength spectrum and λ_{b2} is set at a falling or rising edge wavelength of the output wavelength spectrum.

4. The reader of any one of claims 1 to 3, further comprising a light source.

5. The reader of any one of claims 1 to 4, further comprising a matching index liquid provided to suppress all background wavelengths that are not a Bragg wavelength of the at least one fibre Bragg grating.

6. The reader of any one of claims 1 to 5, further comprising an optical coupler and an optical switch to allow selection of a specific output from an array of optical microfiber sensors provided in the cartridge.

7. A cartridge comprising:

a housing comprising a chamber to receive therein a liquid and a liquid inlet provided through the housing into the chamber; and

at least one optical microfiber sensor comprising a functionalized surface having a compound attached thereto, the compound selected to react in accordance with a specific property of a liquid in which the functionalized surface is immersed, wherein reaction of the compound changes effective refractive index of the at least one optical microfiber sensor, wherein at least part of the functionalized surface is provided in the chamber to be immersed in the liquid,

wherein the housing comprises a top layer and a bottom layer, the chamber defined by a top cavity provided in a lower surface of the top layer and a bottom cavity provided in an upper surface of the bottom layer, and wherein a sensing region of the at least one optical microfiber sensor is provided suspended in the chamber.

8. The cartridge of claim 7, wherein the at least one optical microfiber sensor comprises an array of the optical microfiber sensor, wherein each of the array of the optical microfiber sensor is provided with a different compound.

9. The cartridge of any one of claims 7 and 8, wherein at least part of the functionalized surface is provided on a sensing region of the optical microfiber sensor, the sensing region having a reduced diameter compared with other parts of the optical microfiber sensor.

10. The cartridge of claim 9, wherein the diameter of the sensing region ranges from 3.9 μm to 20 μm.

11. The cartridge of any one of claims 7 to 10, wherein the specific property of the liquid is presence of a target analyte in the liquid, wherein the compound has a high affinity for the target analyte, and wherein the reaction comprises the compound capturing the target analyte.

12. The cartridge of claim 10, wherein the compound comprises a chelating agent and the target analyte comprises a heavy metal ion.

13. The cartridge of claim 10, wherein the compound comprises an antibody and the target analyte comprises a biomarker.

14. The cartridge of any one of claims 7 to 10, wherein the specific property of the liquid is concentration of a target analyte in the liquid, wherein the compound comprises a polymer, and wherein the reaction comprises the compound swelling or shrinking.

15. A method of sensing using an optical microfiber sensor, the optical microfiber sensor comprising a functionalized surface having a compound attached thereto, the compound selected to react in accordance with a specific property of a liquid in which the functionalized surface is immersed, wherein reaction of the compound changes effective refractive index of the optical microfiber sensor, the method comprising the steps of:

(a) passing light through the optical microfiber sensor and at least one fibre Bragg grating;

(b) obtaining with a photodetector a reference peak intensity of Bragg wavelength of the at least one fibre Bragg grating;

(c) immersing in a liquid sample the functionalized surface having the compound attached thereto of the optical microfiber sensor;

(d) obtaining with the photodetector an output peak intensity of the Bragg wavelength without requiring use of an optical spectrum analyser; and

(e) comparing the output peak intensity with the reference peak intensity;

wherein a difference between the output peak intensity and the reference peak intensity quantitatively indicates extent of reaction of the compound in accordance with a specific property of the liquid sample.